REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
04-04-2016	Final	

4. TITLE AND SUBTITLE
Test Operations Procedure (TOP)
03-2-827 Test Procedures for Video Target Scoring Using Calibration Lights

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHORS

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Survivability/Lethality Division (TEDT-AT-SLB)
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8. PERFORMING ORGANIZATION REPORT NUMBER
TOP 03-2-827

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Range Infrastructure Division (CSTE-TM)
U.S. Army Test and Evaluation Command
2202 Aberdeen Boulevard
Aberdeen Proving Ground, MD 21005-5001

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)
Same as item 8

12. DISTRIBUTION/AVAILABILITY STATEMENT

Distribution Statement A. Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

Defense Technical Information Center (DTIC), AD No.:

14. ABSTRACT

This Test Operations Procedure (TOP) describes typical equipment and procedures to setup and operate a Video Target Scoring System (VTSS) to collect projectile point of impact (POI) data within a framed target with a witness screen. While there are various methods and instrumentation that can be used to measure and score projectile POI, the scope of this document is limited to only those test ranges that use a VTSS and calibration lights.

15. SUBJECT TERMS
Video Target Scoring System, VTSS, witness screens, camera, target screen, light pole

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**B. ABSTRACT**	**C. THIS PAGE**			**19b. TELEPHONE NUMBER** *(include area code)*
Unclassified	Unclassified	Unclassified	SAR	42	

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US ARMY TEST AND EVALUATION COMMAND
TEST OPERATIONS PROCEDURE

*Test Operations Procedure 03-2-827 4 April 2016
DTIC AD No.

TEST PROCEDURES FOR VIDEO TARGET SCORING

1. SCOPE.

This Test Operations Procedure (TOP) describes typical equipment and procedures to setup and operate a Video Target Scoring System (VTSS) to collect projectile point of impact (POI) data within a framed target with a witness screen. While there are various methods and instrumentation that can be used to measure and score projectile POI, the scope of this document is limited to only those test ranges that use a VTSS and calibration lights, as illustrated in Figure 1. Other methods and instrumentation are acceptable when agreed upon by the customer and the U.S. Army Test and Evaluation (ATEC) Systems Team (AST), and are supportable by the physical constraints of the test range.

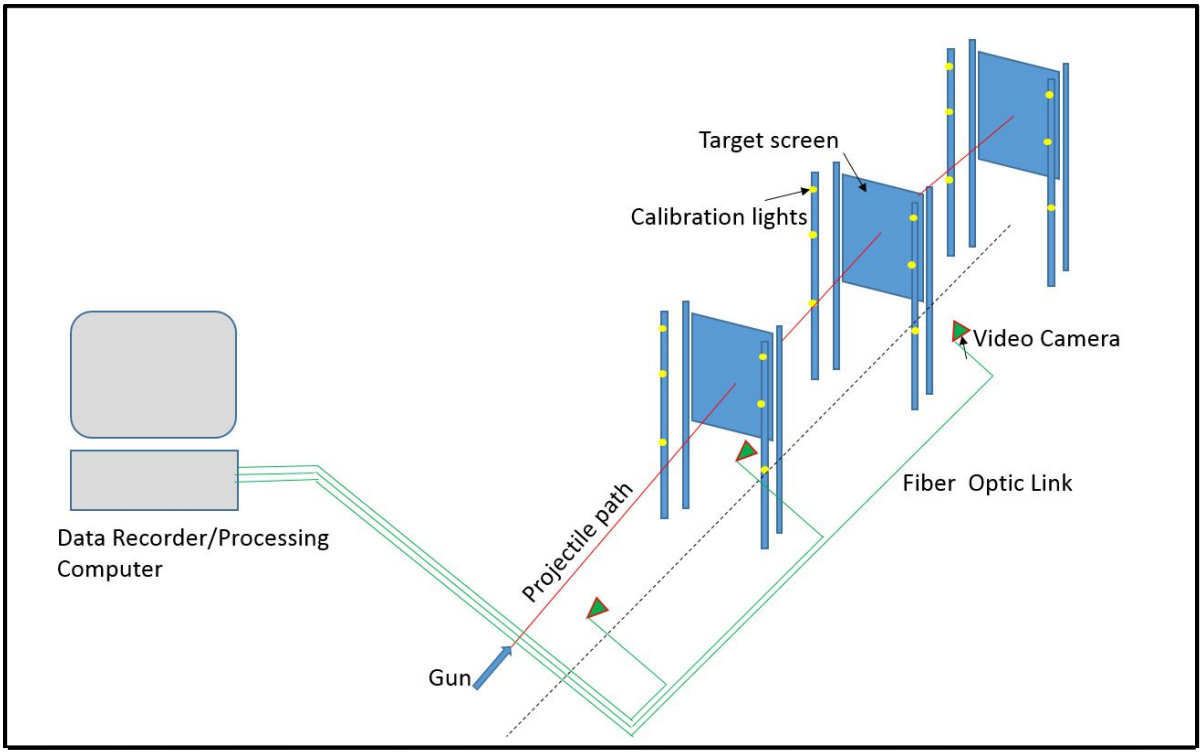

Figure 1. Multi-target setup.

2. FACILITIES AND INSTRUMENTATION.

Figure 1 illustrates a typical setup for a multi-target configuration installed at direct fire ranges. Up to four witness screens are hung between poles along the flight path of the projectile and at distances specified by the test plan to register the projectile's POI in each target. A camera is installed in front of each target to capture the event and transmit video, via a fiber optic link, to a computer at an up range facility. An operator operates the computer to record and process the video to reduce the required data.

2.1 Facilities.

Item	Requirement
Calibration lights	Install bright spot lights on poles in front of the target poles. Their locations must be surveyed and recorded. Lights can be mounted on wood or metal poles, but each type pole can be affected differently by meteorological conditions (wind, thermal loading, etc.) Existing range infrastructure and prevailing environmental considerations should be taken into account when determining what support equipment should be used.
Fiber optic cable	Underground fiber optics to transmit video signal from camera to up range facility.
Target screen	Made of fabric, mesh type is preferred to reduce effect of wind.

2.2 Instrumentation.

Typical instrumentation used for video target scoring with calibration lights are listed below, but the list should not be considered all encompassing. For example, test range infrastructure may only support the use of cameras compatible with National Television System Committee (NTSC) signal format. However, high-definition serial digital interface (HD-SDI) or high speed formats are also acceptable. Prior to each test, all instrumentation and analysis procedures should be discussed and agreed upon by the tester, the customer, and the AST.

Devices for Measuring	Permissible Measurement Uncertainty
Cameras	Signal Format: NTSC or compatible. Sensor Format: 0.5 inch (in.) or larger. Pixel Resolution (horizontal x vertical (H x V)): 720 x 480 or better. Electronic Shutter: 1/60 to 1/30,000 second. Luminance Signal to Noise (S/N) Ratio: >50 decibel (dB). Minimum sensitivity: 1.0 Lux. Operating Temperature: 0 to 60 °Celsius (°C). Operating Humidity: 10% to 90% (non-condensing).

Devices for Measuring	Permissible Measurement Uncertainty
Computer based video recorder	Capable of simultaneously previewing while recording up to four independent NTSC or compatible video sources directly to hard drives without skipping frames. Data throughput to disks 400 megabytes per second (MB/sec) or better. Includes at least 2 terabyte (TB) of hard disk space to store video data. Includes Inter-Range Instrumentation Group (IRIG) and Global Positioning System (GPS) time. Includes scoring software to playback, search frames, process, and reduce POI data. Operating Temperature: 0 to 55 °C. Relative Humidity: up to 95% (non-condensing).
Fiber optics and media converter	Multimode, 50/125 micrometers, 1300/1310 nanometers (nm) wavelength or Single Mode 9/125 micrometers, 1300 nm wavelength.
Survey equipment	Accuracy ± 0.3 centimeters (cm).

3. REQUIRED TEST CONDITIONS.

3.1 Calibration Lights.

3.1.1 Installation.

Calibration lights should be bright and aimed directly at the camera to ensure that they are clearly visible to the camera. Their holders must be rigidly mounted on the pole to prevent displacement or alteration of their orientation relative to camera, due to high wind. The lights could be installed on the target poles or on separate poles with similar height in front of the target poles. It is recommended that calibration lights should be installed on separate poles because the weight of the target screen and wind force exerted on its surface may pull the poles in and thus may alter the surveyed locations of the lights.

3.1.2 Location Survey.

Calibration light locations must be surveyed to at least 0.5 cm accuracy. Survey of calibration lights must be performed prior to the start of a test, after light replacement, and whenever there is a suspicion that their locations have been altered due to environmental conditions (i.e., freezing soil conditions and after heavy rain days), that could induce a measurement error exceeding 4 cm.

3.2 Calibration Light Pole.

Light poles should be erected as straight as possible (plumb). Its base must be firmly set. Where applicable, poles should be stabilized with guy wires. Use poles with appropriate length so that the target screen height can be adjusted to catch the projectile at its highest point in its flight path.

3.3 Camera.

The camera must be firmly mounted and protected from all prevailing environmental conditions to ensure stability and lens alignment. It should be installed at least 400 meters from the target and its offset distance from the line-of-fire must not exceed 10 meters. The camera should be equipped with a lens capable of zooming in to capture a field-of-view narrow enough to include all calibration lights that encompass the intended target area.

4. TEST PROCEDURES.

Detailed procedures to operate the video recorder and scoring software applications are included in Appendix B. Following are brief descriptions of the procedures.

4.1 Set Up.

Prior to the start of each test program, the VTSS operator must obtain a test plan from the Test Officer to determine the number of targets to be scored and seek confirmation from the Test Officer that the survey data are current. At the start of each test day, to get the best pixel resolution, the operator may have to adjust the lens alignment and zoom level to ensure that each camera's field-of-view covers only the target area with calibration lights near the edges of the view. Adjust the focus, if necessary, to get sharp images of the targets then follow the procedures in Appendix B (see Section B.1) to setup the system.

4.2 Calibration Process.

After completing the system setup and before the first firing event of the test day, record a short video segment for each target (see Appendix B, Paragraph 1.2.4) and calibrate each target with the VTSS application (see Appendix B, Section B.2). Calibration must be performed on each test day, or at any time when the camera view is altered as a result of changes in camera location, orientation, zoom, and focus, or when the lights locations are resurveyed. The process of calibration involves carefully locating at least 4 calibration lights in the image of the target using the VTSS application. The detailed calibration process is described in Appendix B, Paragraph B.2.1.3.

4.3 Scoring Process.

Prior to each firing event, that is announced by the Test Officer, activate the video recording function of the Quazar** application to record the event until the projectile impacts the farthest target while monitoring the live video feedback. The process of scoring involves using the VTSS application to playback the recorded video, search for the frame at which the projectile impacts the target, and then locate the POI in the image of the target. Depending upon the type of software used, meteorological data must be recorded from the test range and used for analysis and applying accuracy corrections (i.e. flightpath wind data). The detailed scoring process is described in Appendix B, Paragraph B.2.1.4.

5. DATA REQUIRED.

Since the video target scoring is used as supportive data, requirements for scoring may not be specifically addressed in requirements documents. Data requirements will be coordinated and agreed upon between the test agency, the test sponsor, and the AST. A sample of typical data collected during the survey process is provided in Table 1.

**The use of brand names does not constitute endorsement by the Army or any other agency of the Federal Government, nor does it imply that it is best suited for its intended application.

TABLE 1. SURVEY OF CALIBRATION LIGHTS

Job Identification (ID): XXX				
Date Surveyed: XXX				
Test Site: XXX				
Coordinate System: XXX (local system)				
Units: Meters (m)				
Prepared by: Geodetic Team				
Geodetic Team Contact: XXX				
	Range	**East**	**Elevation**	**Note**
Pt ID	**"Y"**	**"X"**	**"Z"**	
1	0.0000	0.0000	3.6040	Center of Rotation
6001	3004.6010	-0.0009	3.1520	Center 3000M Target Poles (Line of Fire)
1000 Meters:				
1000101	996.8898	-5.9639	21.8700	Light 1
1000102	997.0560	-5.8699	18.4820	Light 2
1000103	997.2995	-5.8295	13.4995	Light 3
1000104	997.5074	-6.0297	7.8360	Light 4
1000105	1001.5954	5.7971	24.2480	Light 11
1000106	996.4507	4.0592	18.4710	Light 12
1000107	996.6609	4.2280	13.4055	Light 13
1000108	996.8667	4.3694	9.8305	Light 14
1000109	950.8356	6.8764	3.4875	Camera Location
2000 Meters:				
2000101	1999.4916	-5.0458	25.7390	Light 1
2000102	1999.0019	-4.6482	17.8010	Light 2
2000103	1998.6656	-4.3698	11.7925	Light 3
2000104	1998.9429	7.0683	25.8825	Light 11
2000105	1998.7021	7.0248	17.8350	Light 12
2000106	1998.5166	7.0433	11.7205	Light 13
2000107	1545.3764	-8.9755	4.7665	Camera Location
3000 Meters:				
3000101	3001.6878	-6.9650	14.9925	Light 1
3000102	3001.5757	-6.8099	10.0270	Light 2
3000103	3001.6256	-6.6942	5.0825	Light 3
3000104	3001.1519	6.6737	15.1010	Light 11
3000105	3001.3563	6.6463	10.0885	Light 12
3000106	3001.6510	6.6695	5.0675	Light 13
3000107	2547.7665	8.9675	3.0656	Camera Location

6. PRESENTATION OF DATA.

a. A data file should be created for each round fired and submitted electronically to the Test Officer. A sample data file is shown in Table 2.

TABLE 2. SAMPLE DATA SHEET

File Name: 4_impact.txt – impact data					
# SCORE_DATE: 09/02/15 # TEST_SITE: B # TEST_NAME: 120					
# RND_NUM: 4 # NUM_TARGETS: 2 VIDEO Version 2.1		RND_TYPE: Unknown			
TARGET: 1000m		TYPE: CLOTH		REF.LIGHT NUM: 3	
AIM TARGET: YES					
IMPACT		AIM		IMPACT From AIM	
HORZ.(m)	VERT.(m)	HORZ.(m)	VERT.(m)	HORZ.(m)	VERT.(m)
4.35	8.01	5.55	5.65	-1.2	2.36
==========					
TARGET: 2500m		TYPE: CLOTH		REF.LIGHT NUM: 3	
AIM TARGET: NO					
IMPACT		AIM		IMPACT From AIM	
HORZ.(m)	VERT.(m)	HORZ.(m)	VERT.(m)	HORZ.(m)	VERT.(m)
3.1	6.28	****	****	****	****
==========					

b. Samples of data stored in the VTSS are shown in Table 3.

TABLE 3. TYPICAL DATA STORED IN THE VTSS

File Name: 02Sep15.Cal - calibration		
TARGET:	1	
INDEX:	0	
CALIBRATED:	YES	
UP_LEFT_CAL:	34	36
SURVEY:	-6.508	31.165
LO_LEFT_CAL:	33	432
SURVEY:	-6.275	18.689
UP_RIGHT_CAL:	599	36
SURVEY:	5.8	31.191
LO_RIGHT_CAL:	599	429
SURVEY:	6.159	18.701
TARGET:	2	
INDEX:	1	
CALIBRATED:	YES	
UP_LEFT_CAL:	31	46
SURVEY:	-6.484	22.775
LO_LEFT_CAL:	24	429
SURVEY:	-6.141	13.327
UP_RIGHT_CAL:	580	48
SURVEY:	5.143	22.63
LO_RIGHT_CAL:	590	435
SURVEY:	5.494	13.212

File Name: 02Sep15_1000m.Qlk – quick view impacts at 1000m target

Date: 9/02/2015
Range: B
Test Officer: Smith
Target: 1000m
Ref. Light Num: 3
Measurement Unit: meter

Round	Impact-Ref		Aim-Ref		Impact-Aim	
	X	Z	X	Z	X	Z
1	5.39	7.21	4.5	6.2	0.89	1.01
2	5.11	7.49	4.5	6.2	0.61	1.29
3	5.39	7.21	4.5	6.2	0.89	1.01
4	5.11	7.49	4.5	6.2	0.61	1.29

TABLE 3. CONTINUED

File Name: 02Sep15_2500m.Qlk – quick view impacts at 2500m target

Date: 9/02/2015
Range: B
Test Director: Smith
Target: 2500m
Ref. Light Num: 3
Measurement Unit: m

Round	Impact-Ref		Aim-Ref		Impact-Aim	
	X	Z	X	Z	X	Z
1	6.56	5.95	****	****	****	****
2	6.8	6.87	****	****	****	****
3	7.29	5.41	****	****	****	****
4	3.1	6.28	****	****	****	****

APPENDIX A. GLOSSARY.

Term	Definition
NTSC	National Television System Committee is the video system or standard used in North America and most of South America. In NTSC, 30 frames are transmitted each second. Each frame is made up of 525 individual scan lines.
IRIG	Inter-Range Instrumentation Group time codes, commonly known as IRIG time codes, are standard formats for transferring timing information.
Quazar	A software application to record video.
VTSS	Video Target Scoring System is a software application to process video and reduce the location of the impact point on a target.
Score	To measure the coordinates of the impact point on a target relative to a fixed point, usually the aim point.

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APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

This Appendix describes operations of the VTSS, which is a computer based video recorder with software applications to record up to four video sources simultaneously, and to locate the projectile impacts on targets. Operations includes configuring camera for each target in use, setting up applications, recording videos, and opening the recorded video files to process and reduce the target impact data.

B.1. QUAZAR APPLICATION.

B.1.1 Start Input Configuration Tool.

a. This tool is used to configure the number of cameras to be used in the test and to name each camera. The tool icon is shown in Figure B-1.

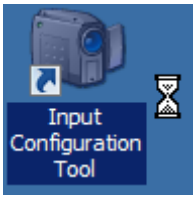

Figure B-1. Input Configuration Tool icon.

b. Figures B-2 through B-5 illustrate the process of setting up the cameras for use in the test. Note that this tool must be run before starting the Quazar application.

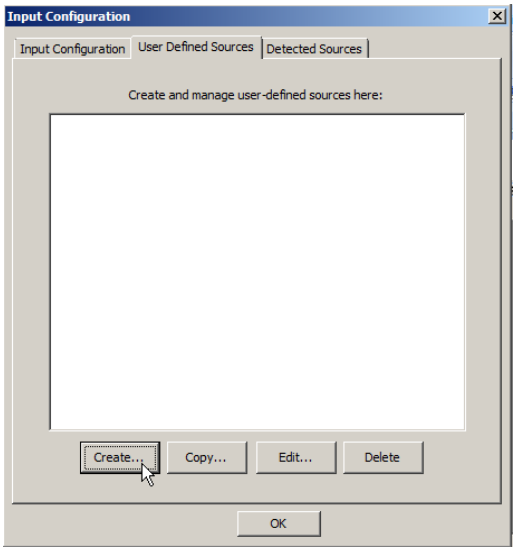

Figure B-2. No input sources.

APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

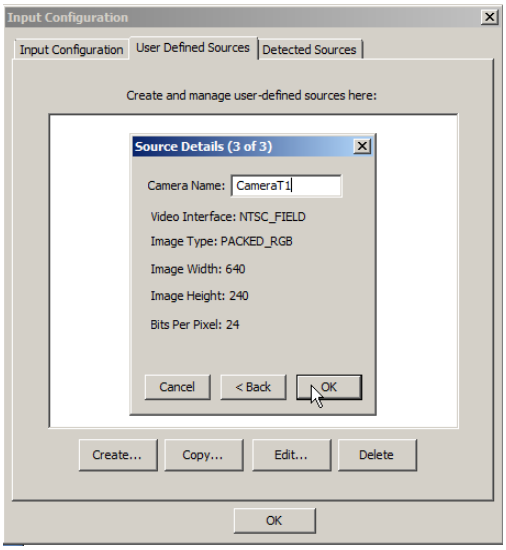

Figure B-3. Naming source.

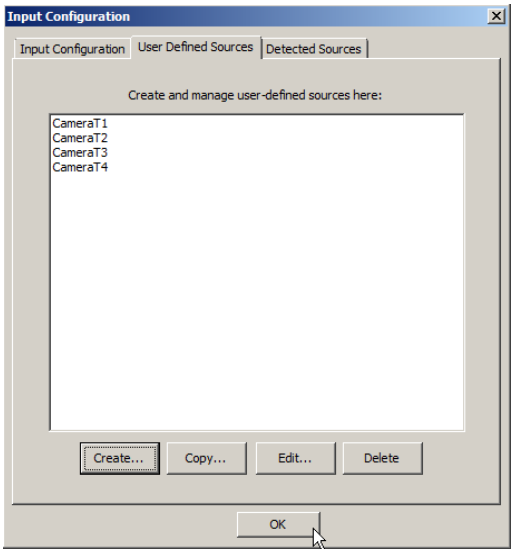

Figure B-4. Existing sources.

APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

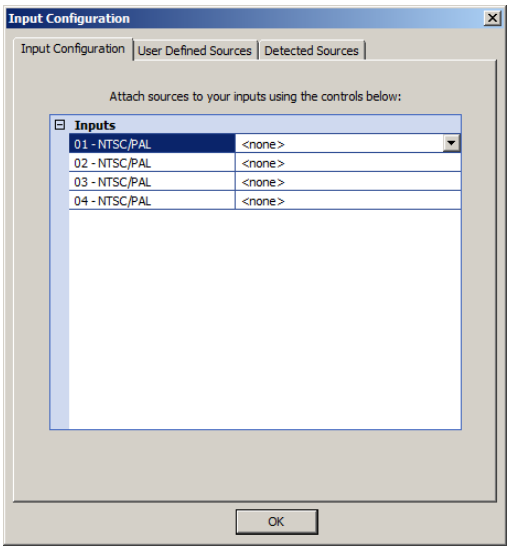

Figure B-5. Source selection.

(1) If the Input Configuration dialog is empty, create sources using the User Defined Sources tab. Follow the screen prompts to select appropriate camera type and name each camera.

(2) On Input Configuration tab, select each available input (camera) for each video source. Note: to rename an existing input, you must delete then recreate it.

B.1.2 Start Quazar.

a. Double click the Quazar icon (Figure B-6) to start the application, Quazar will start to display live videos from all configured sources. Figure B-7 shows the live videos streaming from two configured sources.

Figure B-6. Quazar icon.

APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

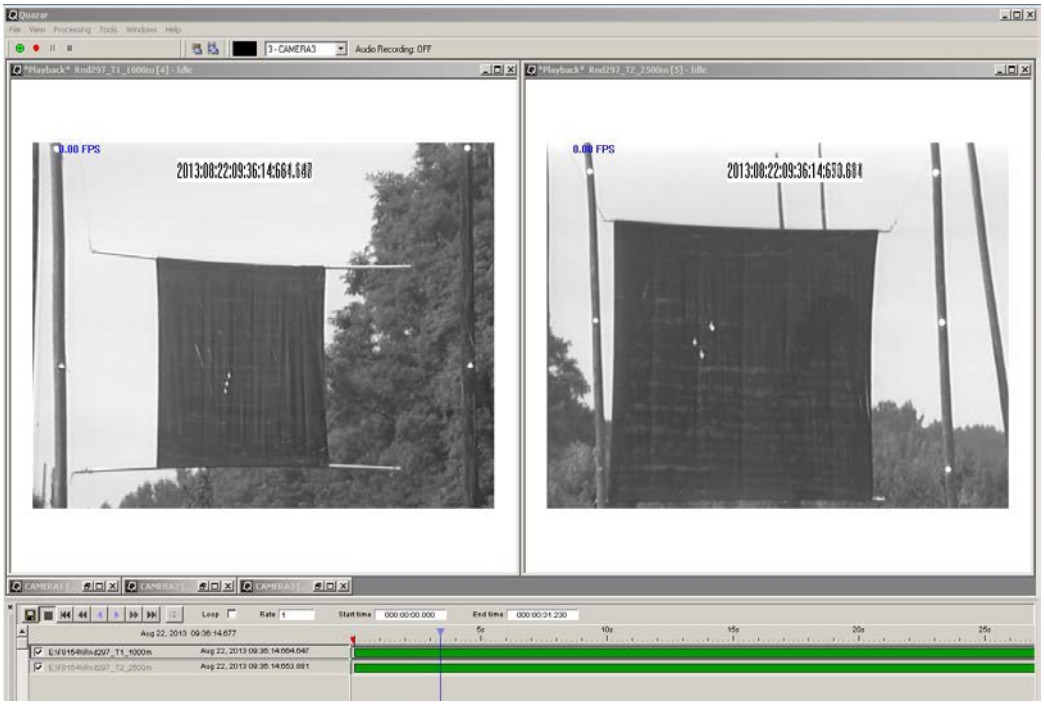

Figure B-7. Live video.

b. Following are the basic setup steps for Quazar. The recorder should be set with these options to work with the Video Target Scoring application. Note that some menu items may be grayed out if live video mode is active. To get all options, stop the live video. Following are the recommended settings.

B.1.2.1 Tools >> System Setting.

Figure B-8 shows the System Settings tab. Make sure to specify Disk as the Recording Destination.

APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

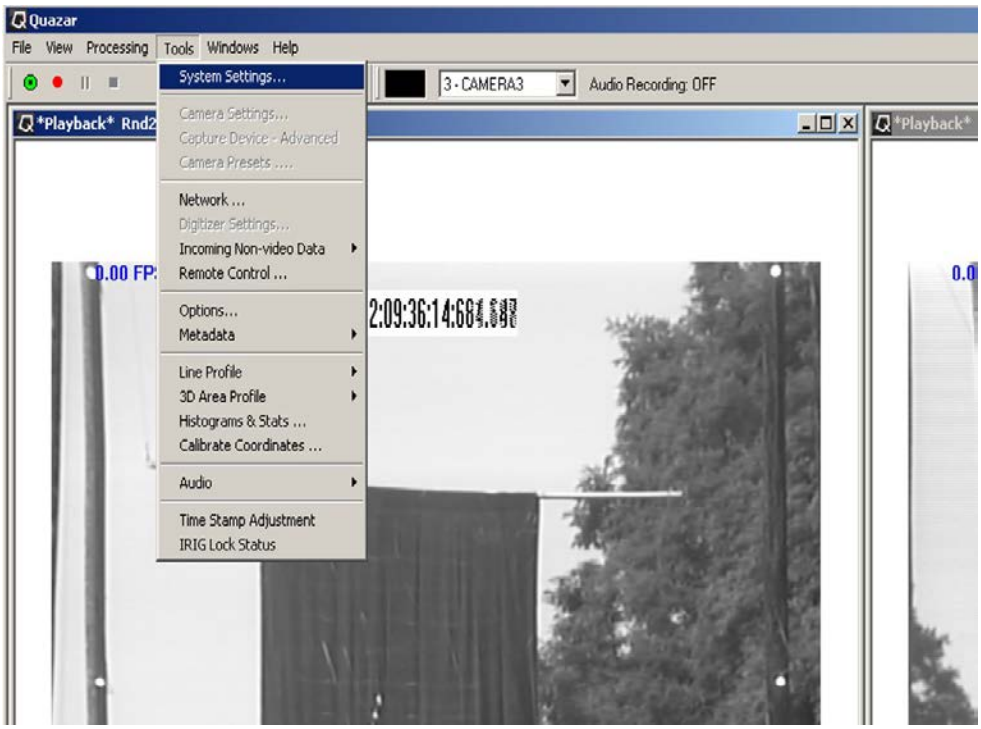

Figure B-8. System Settings tab.

a. System Settings. The Systems Settings tab is shown in Figure B-9.

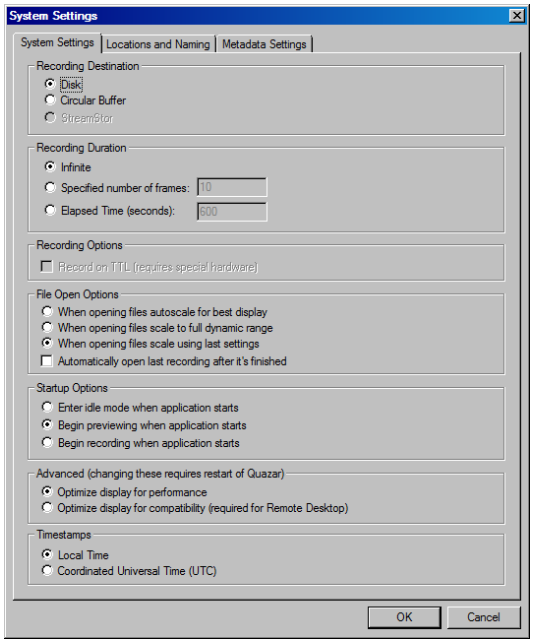

Figure B-9. System Settings.

APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

(1) Recording Destination: Select Disk or Circular Buffer.

(2) Recording Duration: Select Infinite, or Number of Frames, or Elapse Time.

(3) File Open Options: Select When Opening Files Scale Using Last Settings.

(4) Startup Options: Select Begin Previewing When Application Starts.

(5) Advanced: Select Optimize Display For Performance.

(6) Timestamps: Select Local Time.

b. Metadata Settings. The Metadata Settings tab is shown in Figure B-10. For Application Metadata, select Every Time Quazar Starts.

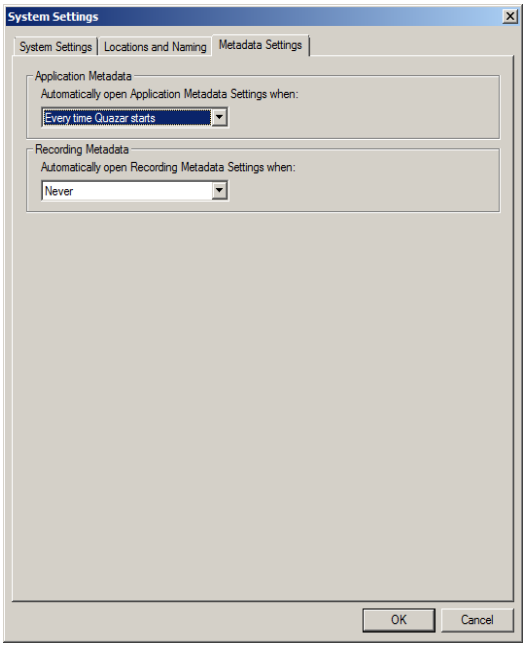

Figure B-10. Metadata Settings.

c. The Locations and Naming tab can be customized; however, to integrate with the scoring program, the Naming Options in the Individual Recording Information must be specified with Metadata strings as below. The Locations and Naming tab is shown in Figure B-11. The process to edit the Metadata file is included in Paragraph B.1.2.3.

APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

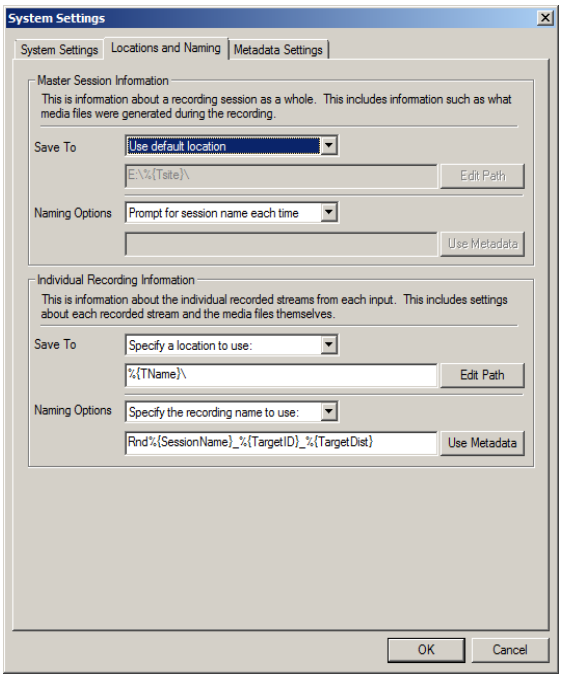

Figure B-11. Locations and Naming.

(1) Save To: Specified a folder in the Video Data drive or select a default location (i.e., E:\).

(2) Naming Options: Select Prompt For Session Name Each Time.

(3) Individual Recording Information.

(a) Save To: Select Specify A Location To Use, then type in a folder name or click Use Metadata button then select appropriate meta strings.

(b) Naming Options: Click Use Metadata button then select appropriate meta strings and insert the underscore symbols to form the string: Rnd%{SessionName}_%{TargetID}_%{TargetDist}.

B.1.2.2 Tools>>Options.

Figure B-12 shows the Options tab.

APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

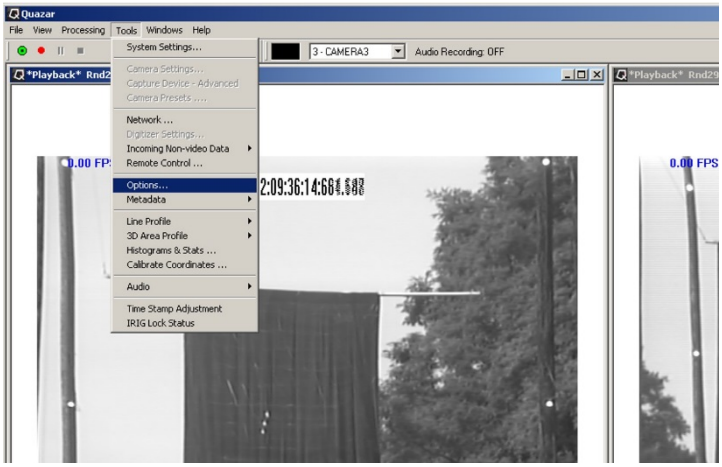

Figure B-12. Options.

a. File. Figure B-13 shows the File tab.

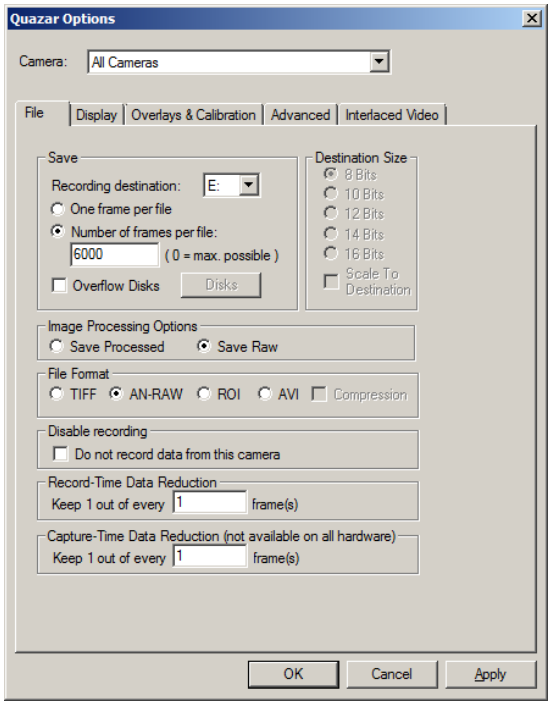

Figure B-13. File.

APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

(1) Recording destination: Select Video Data drive (i.e., E:).

(2) Number of frames per file: Recorded frames that exceed this number will be recorded to different files. Keeping this number high will ensure complete data are included in one file. For maximum possible file size, specify zero.

(3) Image Processing Options: Select Save Raw. Save Raw means data will be saved without any alteration.

(4) File Format: Select RAW-AN for performance benefits.

(5) Record Time Data Reduction: Options to keep every frames or keep one in every numbers of frames.

b. Overlay & Calibration. Use Overlay & Calibration (Figure B-14) to embed frame Timestamp, and Video Title.

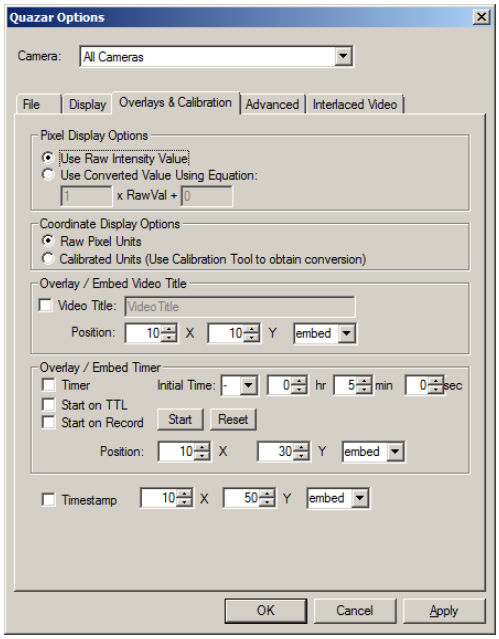

Figure B-14. Overlay & Calibration.

(1) Pixel Display Options: Select Use Raw Intensity Value.

(2) Coordinate Display Options: Select Raw Pixel Units.

(3) Coordinate Display Options: Select Raw Pixel Units.

(4) Overlay / Embed Timer: Select if want to display regular time on video.

(5) Timestamp: select if want to embed and display GPS time in each frame.

c. Display. The Display tab is shown in Figure B-15.

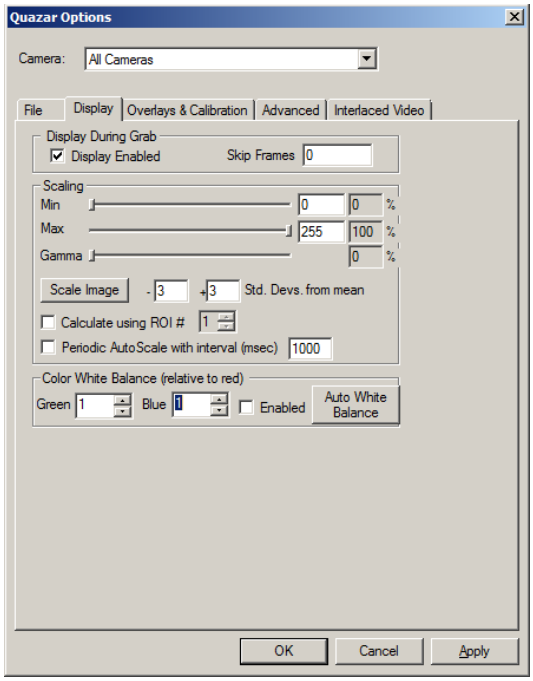

Figure B-15. Display.

(1) Display During Grab: Select Display Enabled.

(2) Scaling: Adjust Min, Max, and Gamma to adjust brightness and contrast of displaying video.

(3) Leave other parameters with default values.

d. Advanced. The Advanced tab is shown in Figure B-16. In this tab, keep the number Maximum Frames Captured to Memory small to attain the best possible recording speed. This number specifies how many of most recent frames will be kept in memory while data are written into the hard drive.

APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

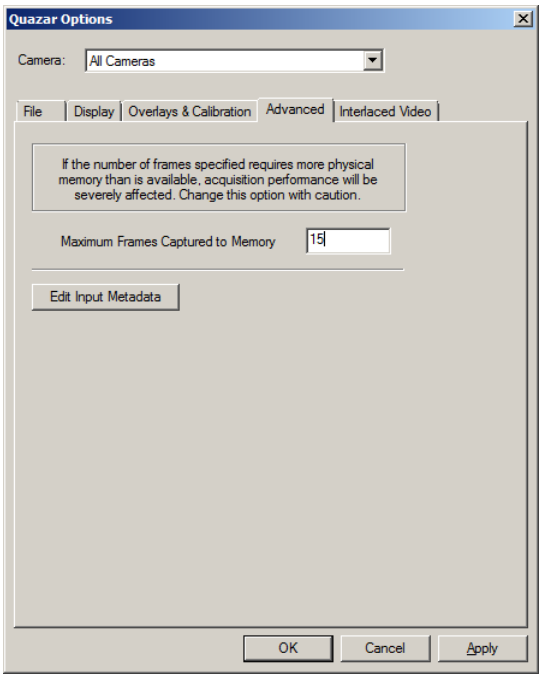

Figure B-16. Advanced.

e. Interlaced Video. The Interlaced Video tab is shown in Figure B-17.

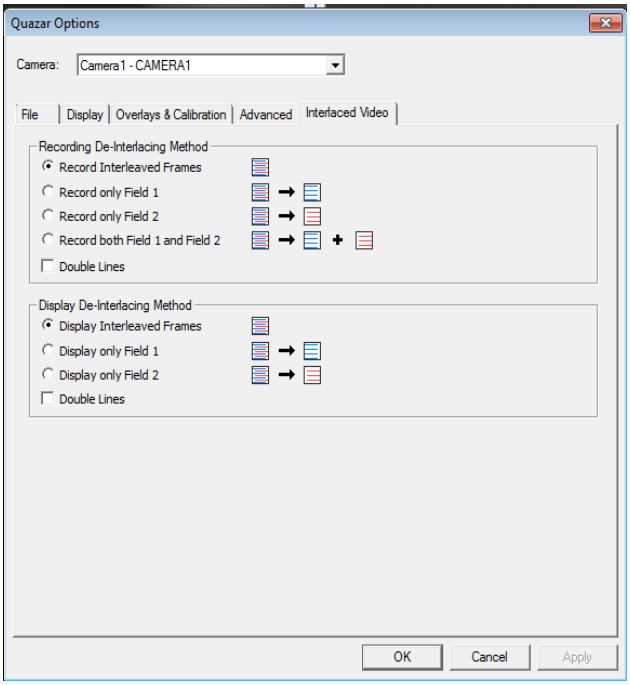

Figure B-17. Interlaced Video.

APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

(1) Select Record Interleaved Frame.

(2) Select Display Interleaved Frame.

B.1.2.3 Tool >>Metadata.

The Metadata tab is shown in Figure B-18.

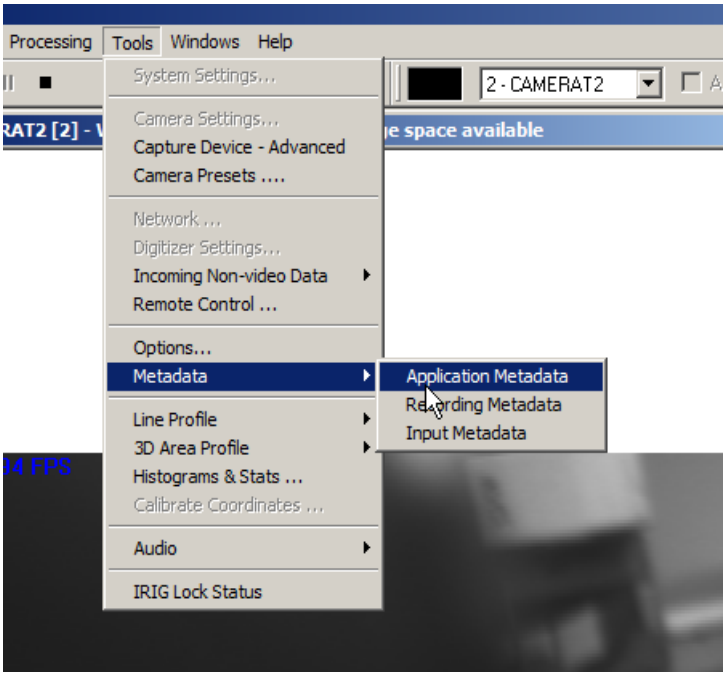

Figure B-18. Metadata.

a. Application Metadata. The Application Metadata tab is show in Figure B-19. Settings are use to keep track of recorded video data relating to each test program. Enter appropriate information then click OK.

APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

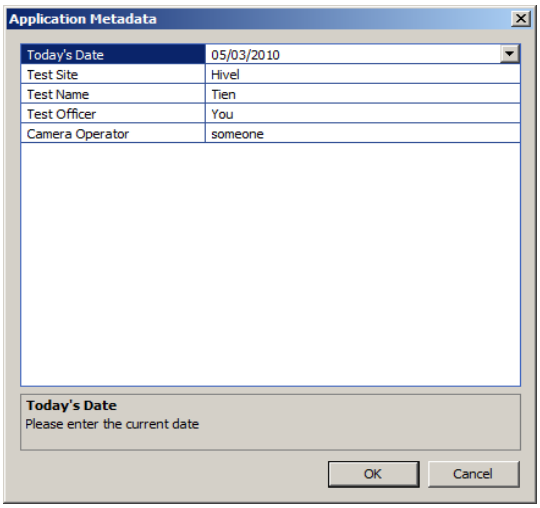

Figure B-19. Application Metadata.

b. Input Metadata. Used for setting up names for individual recording video segments. For each video source (camera), make selections to specify camera type, target identification, and target distance. The Meta strings setup in this action will be used to form recorded file names in the System Setting menu, Paragraph B.1.2.1.c. Note that selections made in this dialog will *affect only one* camera. To associate the inputs with a certain camera, make sure that its image window is selected by clicking anywhere in its image window before executing the menu command. The other way to accomplish the same thing is to right mouse click on the image window of the camera to execute the menu command from the popup menu. Figure B-20 shows the Input Metadata tab.

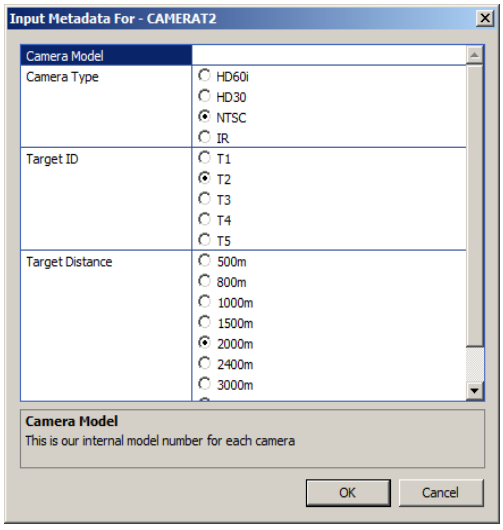

Figure B-20. Input Metadata.

APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

B.1.2.4 Recorder Basic Functions.

The recorder basic function buttons are shown in Figure B-21.

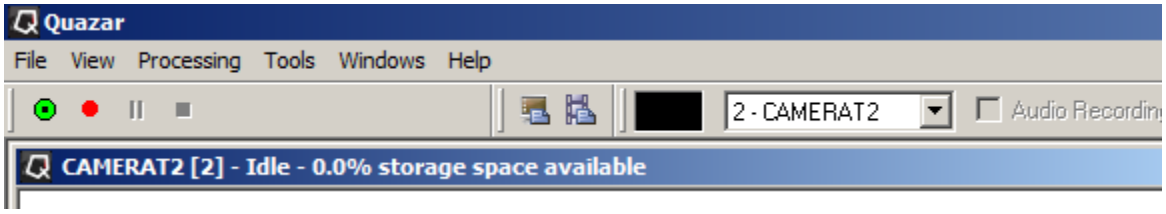

Figure B-21. Recorder functions.

a. Displaying Live Video. Click the ***green button*** to show live videos as they are streaming in from each camera.

b. Recording.

(1) Click the ***red button*** to arm the recorder. A dialog will pop-up for the user to enter the session (round) number. The session number is used in forming the filename for the recorded video sequences. The session number input window is shown in Figure B-22.

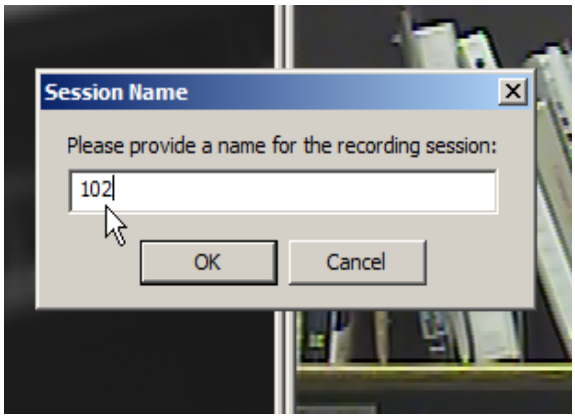

Figure B-22. Session number input.

(2) Type in the next round number. The recorder will start after button OK is clicked. If the session number already exists (same session number was recorded previously), Quazar will ask if you want to overwrite it.

(3) In case there was a missed firing, you should stop the recording then record again without changing the session number, then accept to overwrite it when asked. The recording will start after user clicks OK.

c. Stop Recording. The recording can be stopped anytime by clicking the ***square button***.

B.2. VIDEO TARGET SCORING APPLICATION.

B.2.1 Start VTSS Application.

Double click the VTSS icon (Figure B-23) to start the application. VTSS is an application that processes video sequences that were recorded by the recording application (Quazar) to determine impact locations of projectiles in a target. It uses the name of the recorded video file to identify the round number that it's working on. Therefore, it's imperative that Quazar has to conform to a predefined naming convention for the recorded video sequences as described in Paragraph 1.2.1 (**Tools >> System Setting**), to enable VTSS to function properly.

Figure B-23. VTSS icon.

B.2.1.1 Setup Administrative Test Information.

The Test Information tab is shown in Figure B-24.

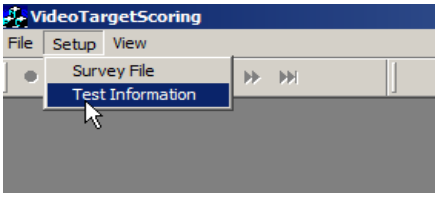

Figure B-24. Test Information.

a. Enter the General setup information tab and cycle thru all targets as shown in Figures B-25 and B-26. Make sure to select Use This Target for each target in use for the test. Also make sure the lights that comprised the Field of View (FOV) are selected. The FOV is defined by the outmost lights, as shown in Figure B-27.

APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

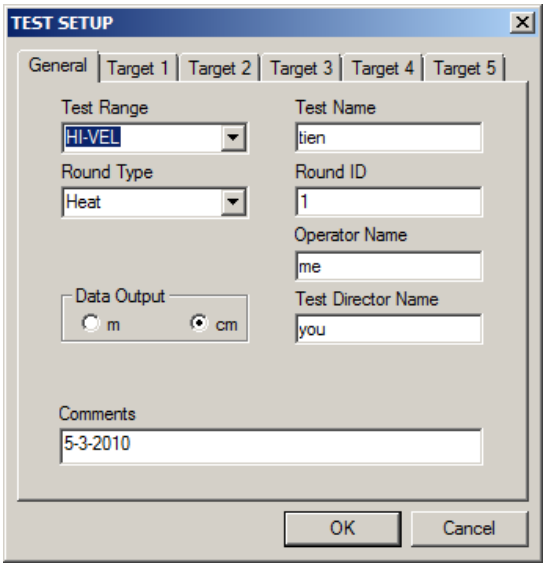

Figure B-25. General information.

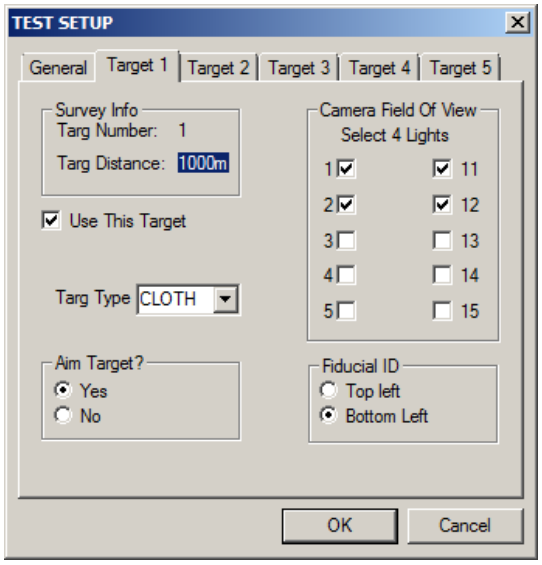

Figure B-26. Target setup.

APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

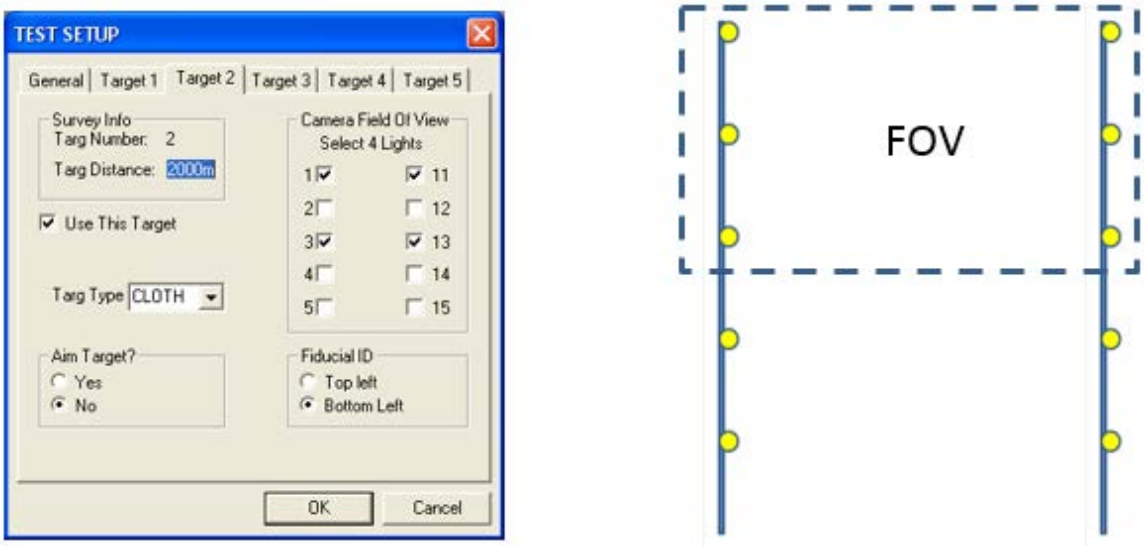

Figure B-27. Camera FOV.

B.2.1.2 Setup Survey Data For Each Target.

a. Select a Test Site and enter survey data for each target as shown in Figure B-28.

Figure B-28. Survey file.

b. A multi-tab dialog (Figure B-29) will appear and load survey data for each target. The user must review and edit the data to ensure correctness before continuing.

APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

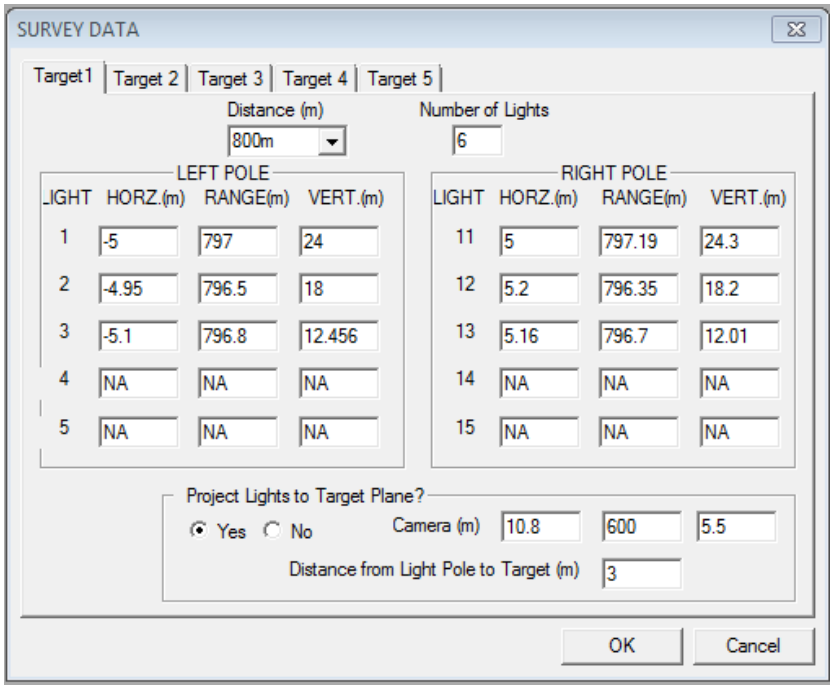

Figure B-29. Survey data dialog.

c. The lights are numbered top-down. Numbers 1 to10 will be reserved for the left pole and numbers 11 to 20 will be for the right pole. The Number of Lights must match the number of lights with valid data. Enter NA for not-available data. Note that when calibration lights are installed on poles in front of the target screen, select “Yes” to project their surveyed locations on to the target planes.

B.2.1.3 Calibration.

At the beginning of each test day, or whenever a camera parameter has changed such as its location, focus length, zoom level, or refocus, a new image must be captured and new calibration data must be regenerated. This section illustrates the process of calibration for each target.

a. Use the menu File>>Open then select the newly captured image.

b. Press the right mouse button on the target image and select Calibrate (see Figure B-30).

APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

Figure B-30. Calibration menu.

c. Select calibration light ID then click its corresponding location in the image. Locate at least 4 calibration lights shown in the image. Click Done to complete the calibration process. The application will transform their locations (pixels) to corresponding surveyed location to generate the calibration parameters. Figure B-31 shows the calibration process windows.

Figure B-31. Calibration process.

B.2.1.4 Scoring Point of Impact.

After completing the calibration process, the VTSS application is ready for scoring the target impacts. The scoring process includes:

APPENDIX B. VIDEO TARGET SCORING SYSTEM USER GUIDE.

a. Use the menu File>>Open then select the video files recorded when firing a round. Use the player controller to visually search for the frame at which the projectile penetrates the target screen as shown in Figure B-32.

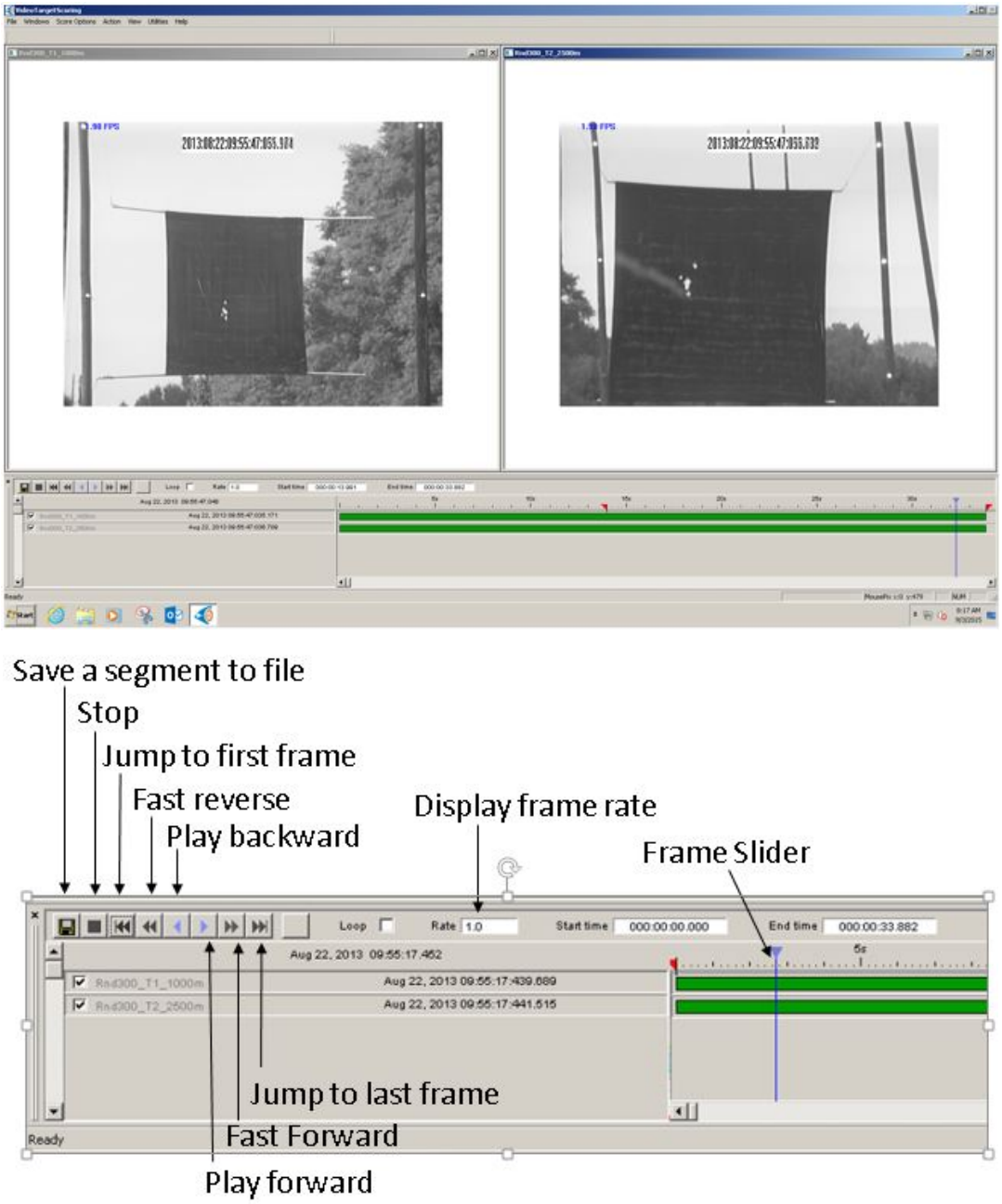

Figure B-32. Player controller.

b. Place the mouse pointer in each video window, press the right button of the mouse to select Score (see Figure B-33).

Figure B-33. Score menu.

c. Click the hole in the captured image. When the Done button is clicked, the application will transform its location from pixel to physical measurements. Before clicking Done, observe if any of the blue crosshairs are off center of the lights and re-center them. The steps to re-center the blue crosshairs include: first, click the reset button; second, select a light button; third click the light in the image and using the arrow keys adjust the blue crosshair's location. Figure B-34 shows the Scoring window.

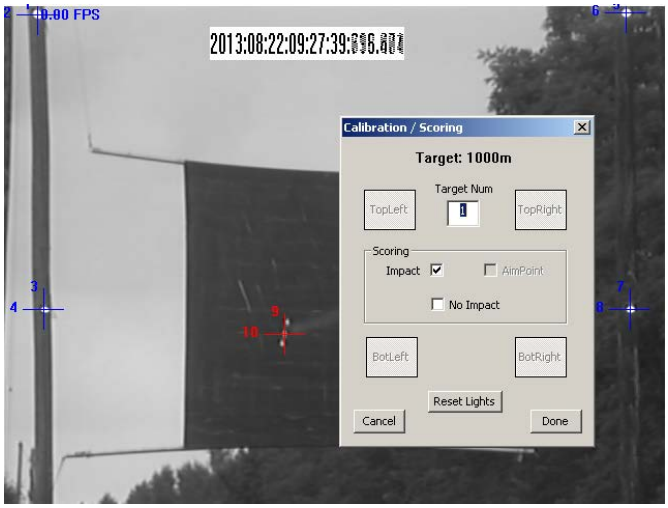

Figure B-34. Scoring impact.

d. Repeat the process for each target in use. After all targets in use are scored, the program will save the results and be ready for scoring the next round.

APPENDIX C. ABBREVIATIONS.

ATC	U.S. Army Aberdeen Test Center
ATEC	U.S. Army Test and Evaluation Command
AST	U.S. Army Test and Evaluation Command (ATEC) Systems Team
C	Celsius
cm	centimeter
dB	decibel
FOV	field of view
GPS	Global Positioning System
H	horizontal
HD-SDI	high-definition serial digital interface
in.	inch
IRIG	Inter-Range Instrumentation Group
m	meter
MB/sec	megabytes per second
NA	not available
nm	nanometer
NTSC	National Television System Committee
POI	point of impact
S/N	signal to noise
TB	terabyte
TOP	Test Operations Procedure
V	vertical
VTSS	Video Target Scoring System

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APPENDIX D. REFERENCES.

For information only (related publications).

U.S. Army Aberdeen Test Center (ATC) Regulation No. 70-21, Automated Video Target Scoring System Operation, 10 March 1998.

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APPENDIX E. APPROVAL AUTHORITY.

CSTE-TM 4 April 2016

MEMORANDUM FOR

Commanders, All Test Centers
Technical Directors, All Test Centers
Directors, U.S. Army Evaluation Center
Commander, U.S. Army Operational Test Command

SUBJECT: Test Operations Procedure (TOP) 03-2-827 Test Procedures for Video Target Scoring Using Calibration Lights, Approved for Publication

1. TOP 03-2-827 Test Procedures for Video Target Scoring Using Calibration Lights, has been reviewed by the U.S. Army Test and Evaluation Command (ATEC) Test Centers, the U.S. Army Operational Test Command, and the U.S. Army Evaluation Center. All comments received during the formal coordination period have been adjudicated by the preparing agency. The scope of the document is as follows:

This TOP describes typical equipment and procedures to setup and operate a Video Target Scoring System (VTSS) to collect projectile point of impact (POI) data within a framed target with a witness screen. While there are various methods and instrumentation that can be used to measure and score projectile POI, the scope of this document is limited to only those test ranges that use a VTSS and calibration lights.

2. This document is approved for publication and will be posted to the Reference Library of the ATEC Vision Digital Library System (VDLS). The VDLS website can be accessed at https://vdls.atc.army.mil/.

3. Comments, suggestions, or questions on this document should be addressed to U.S. Army Test and Evaluation Command (CSTE-TM), 2202 Aberdeen Boulevard-Third Floor, Aberdeen Proving Ground, MD 21005-5001; or e-mailed to usarmy.apg.atec.mbx.atec-standards@mail.mil.

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Forward comments, recommended changes, or any pertinent data which may be of use in improving this publication to the following address: Range Infrastructure Division (CSTE-TM), US Army Test and Evaluation Command, 2202 Aberdeen Boulevard, Aberdeen Proving Ground, Maryland 21005-5001. Technical information may be obtained from the preparing activity: Survivability/Lethality Division (TEDT-AT-SLB), U.S. Army Aberdeen Test Center, 400 Colleran Road, Aberdeen Proving Ground, Maryland 21005-5001. Additional copies can be requested through the following website: http://www.atec.army.mil/publications/topsindex.aspx, or through the Defense Technical Information Center, 8725 John J. Kingman Rd., STE 0944, Fort Belvoir, VA 22060-6218. This document is identified by the accession number (AD No.) printed on the first page.